MONOGENETIC TREMATODES OF GULF OF MEXICO FISHES. PART III.

THE SUPERFAMILY GYRODACTYLOIDEA *(Continued)*[1]

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This paper is the third of the present series treating the monogenetic trematodes of the Gulf of Mexico. It deals specifically with several species belonging to the subfamilies Tetraonchinae Monticelli, 1903, and Diplectaninae Monticelli, 1903, *emend.*, and is a continuation of the data concerning members of the superfamily Gyrodactyloidea Johnston and Tiegs, 1922, obtained during a recently concluded study of these ectoparasites. The scope organization and purpose are the same as for preceding installments.

All measurements were made using an ocular micrometer and are cited in millimeters. In the cases of curved structures measurements are of lines subtending the greatest arcs of those structures. In the descriptions given below the mean is given first, followed by the minima and maxima in parentheses. The number of measurements used to derive the mean is usually the same as the number of individuals measured; otherwise the actual number employed appears in parentheses before the measurements. All drawings were made with the aid of the camera lucida.

PSEUDOHALIOTREMA MUGILINUS n. sp.

(Figures 44-48)

Host: *Mugil caphalus* Linn., Striped Mullet, a bentho-littoral euryhaline marine mugilid.

Location: Gills.

Locality: Alligator Harbor, Franklin Co., Florida.

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[1] Contribution from the Biological Laboratories of the Citadel and the Zoology Dept. and Oceanographic Inst. of Florida State University, Tallahassee.

Acknowledgments and dedications of the present installment are largely the same as for preceding ones. In addition, however, the writer wishes to thank Drs. M. H. Knisely and C. A. Higginbotham of the Dept. of Anatomy, Medical College of South Carolina, Charleston, for making optical equipment and working space available for parts of this study.

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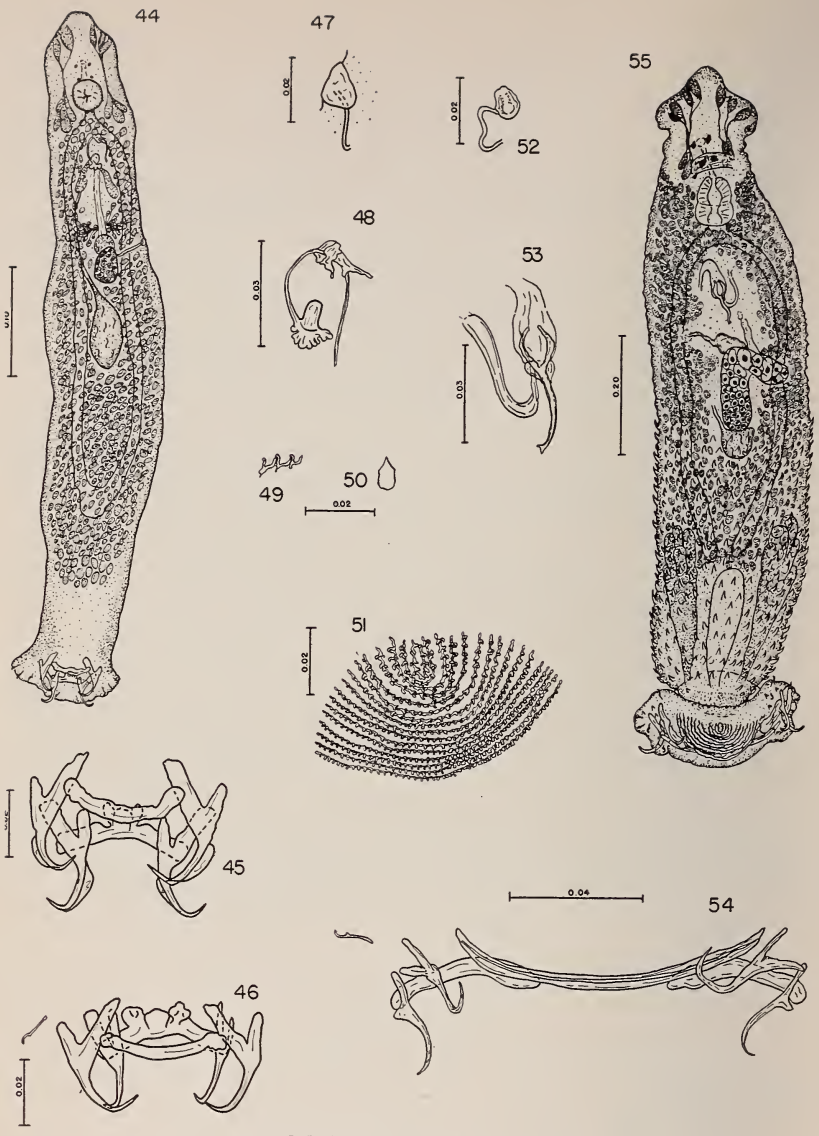


Pseudohaliotrema mugilinus n. sp.

44. Whole mount, dorsal view.
45. Haptoral complex, dorsal view.
46. Haptoral complex, dorsal view.
47. Vagina.
48. Cirrus complex.

Diplectanum bilobatus n. sp.

49. Squamodisk sclerites.
50. Scale-like body spines.
51. Squamodisk.
52. Vagina.
53. Cirrus complex.
54. Haptoral complex.
55. Whole mount, dorsal veiw.

Number studied: 135.
Number measured: 5.
Holotype: USNM Helm. Coll. No. 49342.
Paratype: USNM Helm. Coll. No. 49343.

Description: Body somewhat cylindrical, 0.633 (0.605-0.656) long by 0.113 (0.102-0.133) wide, anterior end angular. Cuticle thin and smooth. Prohaptor of 2 to 3 pairs of antero-lateral head organs connected by ducts to cephalic glands lying lateral and posterior to the pharynx. Opisthaptor a slightly flared disk about 0.084 (0.076-0.096) in diameter, opening posteriorly and armed with 2 pairs of centrally located anchors, 2 bars and 14 hooks. Both anchor pairs similar in shape, with long superficial roots, short deep roots, recurved tips and delicate wing-like expansions along shafts; ventral anchors 0.034 (0.032-0.036) long by (4) 0.003 (0.003-0.004) wide at base; dorsal anchors 0.034 (0.028-0.038) long by 0.003 (0.003-0.005) wide at base. Bars slightly dissimilar in size, apparently not articulated with one another; ventral bar broadly V-shaped with prominent anterior sculpturing, 0.037 (0.031-0.043) long by 0.009 (0.008-0.009) wide, dorsal bar broadly V-shaped, smooth, with expanded ends, 0.035 (0.032-0.037) long by 0.005 (0.004-0.005) wide. Hooks delicate, 0.010 (0.009-0.010) long, with thin shafts and recurved tips. Mouth midventral at level of anterior eyespots; narrow buccal canal. Pharynx ovoid, 0.036 (0.025-0.067) long by 0.029 (0.023-0.034) wide, muscular; esophagus very short. Gut bifurcated, crura unramified, confluent posteriorly. Testis saccate (4) 0.058 (0.050-0.066) long by (4) 0.030 (0.023-0.038) wide, equatorial; vas deferens reaching seminal vesicle via left side. Seminal vesicle variable in outline, postero-sinistral to cirrus. Cirrus complex consisting of a dome-like cirrus bulb, cirrus and possibly an accessory piece. Cirrus bulb at base of cirrus; cirrus a long, thin, recurved, hollow tube, 0.033 (0.029-0.038) long by 0.001 wide, surrounded at the curve by an irregular cuticularized mass that may be an accessory piece and not just a cirrus ornamentation. Prostate reservoir postero-dextral to cirrus. Genital pore common, ventral to gut bifurcation. Ovary saccate, pretesticular, slightly dextral to midline; oviduct short. Ootype short; uterus runs anterior in the midventral line to genital pore. Vaginal pore on right margin at ovarian level, surrounded by a cuticularized external plate; vaginal duct cuticularized, opening into spherical seminal receptacle. Seminal receptacle apparently opens into oviduct immediately anterior to ovary. Mehlis' gland around ootype just anterior to seminal receptacle. Vitellaria follicular, near intestinal crura, extending from level just posterior to pharynx slightly past posterior confluence of gut; transverse vitelloducts joining oviduct anterior to seminal receptacle. Egg not observed. Two pairs of angularly situated eyespots antero-dorsal to pharynx.

Discussion: *Pseudohaliotrema mugilinus* n. sp. differs from all others in the genus in the following respects: (1) median ornamentation of the ventral bar, (2) long, thin shape of the cirrus, (3) shape of anchor roots, (4) host.

Haplocleidus vanbenedenia (Parona and Perugia, 1890) Palombi, 1949 (= *Ancyrocephalus venbenedeni*) from the gills of *Mugil auratus* Risso from Genoa is apparently very similar to the present species, but differs in the following respects: (1) ornamentation of the ventral bar, (2) cirrus ornamentation, (3) larger size of anchor pairs, (4) host.

As is mentioned in Part I of this series, the characters used to separate the genus *Haplocleidus* from other Tetraonchinae are not strong. In addition, the original description and redescriptions of *H. vanbenedeni* are lacking in detail. Therefore, *H. vanbenedeni* needs restudy based on fresh material as does the genus.

Genus Tetrancistrum Goto and Kikuchi, 1917

This tetraonchid genus is another which can be easily confused with *Ancyrocephalus* Creplin, 1839 and badly needs rediagnosis. A cursory study of the figures and description of the type species, *Tetrancistrum sigani* Goto and Kikuchi, 1917, indicates that the following characters are present: (1) crura of gut laterally ramified, (2) eyespots present, (3) vas deferens entirely between the intestinal crura medially, (4) Mehlis' gland elements often extend lateral to crura. Some of these features are undoubtedly taxonomically significant. Neither Price (1937) nor Sproston (1946) included these characters in their diagnoses of *Tetrancistrum*. In addition, Price (1937) placed *Tetrancistrum longiphallus* (MacCallum, 1915) Price, 1937 in this genus even though it lacks the first and last of the above characters. Due to the uncertain taxonomic condition of the entire subfamily a reassignment of this species cannot now be made; however, future rediagnosis of the genus may necessitate such action.

T. lutiani Tubangui, 1931, may also have to be reassigned because it, too, apparently does not have the ramified intestinal crura and lateral Mehlis' gland elements mentioned above.

Yamaguti (1953) is the first recent author to recognize the lateral rami of the intestinal crura as being diagnostically significant in these tetraonchids. Because he has actually collected and reported the type species several times it must be assumed that he has verified the presence of these rami.

Tetrancistrum longiphallus (MacCallum, 1915) Price, 1937

Synonyms: *Ancyrocephalus chaetodipteri* Pearse, 1949, n. syn.; *Ancyrocephalus longiphallus* (MacCallum, 1915) Johnston and Tiegs, 1922 and *Diplectanum longiphallus* MacCallum, 1915.

Host: *Chaetodipterus faber* (Broussonet) Spade Fish, a nerito-pelagic marine ephippid.

Location: Gills.

Locality: Alligator Harbor, Florida.

Previously reported host and localities: *C. faber* from Beaufort, N. C.

(Pearse, 1949) and New York Aquarium (MacCallum, 1915).
Number studied: 217.

A study of the type slides, Pearse's USNM Helm. Coll. slide No. 36959 and MacCallum's USNM Helm. Coll. slide No. 35702, and comparison of these with the specimens in the present collection show that the forms described by Pearse (1949) as *Ancyrocephalus chaetodipteri* and MacCallum (1915) as *Tetrancistrum longiphallus* are the same species and their names synonymous. Also, the specimens in the present collection, while a little different, are actually conspecific with them. Some of the variations between the species in the present collection and those in the collections of others are: (1) some slight differences in the shape of the haptoral bar ends, (2) anchors vary slightly in shape, etc. Since these characters are actually variable within the collection they are probably not taxonomically significant. MacCallum (1915) described the gut as not confluent posteriorly, but it is confluent in the specimens of the present collection. Fourteen marginal hooks are present. Peduncle glands were also observed in many specimens. In addition, eyespots are present, consisting of many small, melanistic granules scattered in the antero-dorsal region. These were also found in the type slides of MacCallum and Pearse. Similar dots can be observed in the original figures of Goto and Kikuchi (1917) for the type species, *T. sigani*. These dots are labelled "brain" but they are probably photo-receptive granules.

T. longiphallus may not even belong to the genus in which it is presently placed, but its removal must await future taxonomic work.

Subfamily Diplectaninae Monticelli, 1903, *diag. emend.*

Diagnosis: Dactylogyridae in which the posterior half of the body is generally covered with anteriorly directed cuticular spines. Head organs and cephalic glands present. Haptor or peduncles bear plaques,[2] either dorsal and ventral squamodisks alone or dor-

[2] The word *Plaque* is proposed as a new term (though used by Sproston, 1946, in an informal way) to apply to the complex holdfasts that are superficially located in the posterior body region and probably derived from the cuticular layers of the organisms possessing them. The different types of Plaques are: *Lateral plaques*—lateral expansions consisting either of many spines or a simple raised area of the cuticle, *Dorsal* and *Ventral Plaques*—subrectangular groups of hook-like spines on the peduncle, often overlapping the anterior margin of opisthaptor; and Squamodisks—oval or circular structures composed of groups of concentrically arranged rows of small spines or lamellate rows of larger, curved spines.

sal, ventral and lateral plaques or, exceptionally, lateral palques only (*Rhabdosynochus*). Two pairs of anchors, three or four bars, and 14 hooks present. Cirrus cuticularized. Genital pore common. Vagina present. Ovary often looped around right intestinal crus.

Type genus: *Diplecatanum* Diesing, 1858

The above emendation is made in the subfamily diagnosis to permit the inclusion of *Rhabdosynochus* Mizelle and Blatz, 1941, *emend.* which is definitely a diplectanid genus, and *Rhamnocercus* Monaco, Wood and Mizelle, 1954, *emend.*, whose affinities are thought to be too closely diplectanid to support its being used as the basis of a new tetraonchid subfamily (Rhamnocercinae Monaco, Wood and Mizelle, 1954) as was done by the original authors.

The precise status of the genus *Neodiplectanum* Mizelle and Blatz, 1941, must be established by future studies because recent work indicates that it is not very different from *Diplectanum*. It now appears that the two dorsal bars of *Neodiplectanum* are probably similar to those of other diplectanids.

It is possible that the two dorsal bars of Diplectaninae are homologous to the single dorsal bars of the Tetraonchinae. There is actually a member of the latter subfamily, *Hematopeduncularia bagre* Hargis, in press, whose dorsal bar appears to have developed in two parts. In addition, the two lateral bars of *Murraytrema* Price, 1937, if they actually are homologous to the dorsal bars, may represent an intermediate stage between the medially placed two bars of some tetraonchids and laterally placed bars of diplectanids.

Genus Diplectanum Diesing, 1856

Diplectanum should be restudied critically because there is a strong possibility that several natural groups that deserve generic status are included therein.

Diplectanum bilobatus n. sp.

(Figures 49-55)

Host: *Cynoscion nebulosus* (Cuvier and Valenciennes) Spotted Squeteague, a bentho-littoral marine sciaenid.

Location: Gills.

Locality: Alligator Harbor, Franklin Co., Florida and Grand Isle, Jefferson Parish, La.

Number studied: 47.

Number measured: 5.
Holotype: USNM Helm. Coll. No. 49344.

Description: Body elongate, 0.502 (0.388-0.573) long by 0.124 (0.096-0.140) wide, sides nearly parallel, narrowed at level of the eyespots and immediately anterior to opisthaptor, anterior end angularly spatulate. Skin apparently thin and nearly smooth anteriorly, bearing numerous anteriorly projecting scale-like spines around posterior part of body behind level of ovary. Prohaptor of 3-4 pairs of head organs connected by ducts to posterior cephalic glands. Opishaptor wider than long, 0.104 (0.070-0.153) long by 0.105 (0.070-0.146) wide, somewhat lobulate, armed with dorsal and ventral squamodisks, 2 pairs of anchors, 3 bars, at least 6 pairs of hooks and 2 laterally placed groups of scale-like spines which are near the anchor roots. Anchor pairs similar in size, dissimilar in shape, each member of a pair on opposite lobes of haptor. Ventral anchors 0.034 (0.030-0.041) long by 0.003 (0.003-0.004) wide at base, superficial roots long and thin, set at an unusual angle, deep roots stouter and slightly longer than that of dorsal anchor, shaft short, somewhat angularly recurving tip; dorsal anchors 0.033 (0.030-0.035) long by (4) 0.003 wide at base, superficial roots vestigial, deep roots elongate. Ventral bar very long and thin, slightly curved, 0.074 (0.030-0.094) long by 0.004 (0.003-0.005) wide, with longitudinal furrow; dorsal bars narrower laterally than medially, 0.038 (0.034-0.042) long by 0.007 (0.005-0.010) wide, situated laterally on haptor lobes, articulating with dorsal anchors and attached medially by strong muscular elements. Hooks, only 6 pairs seen, marginal on lateral lobes, 0.009 (0.008-0.009) long, with narrow, delicately curved shafts and sickle-shaped terminations. Squamodisks slightly dissimilar in size, ventral wider than dorsal and often more anteriorly placed, composed of concentrically arranged, chain-like rows of very small somewhat Y-shaped cuticularized pieces; ventral squamodisk 0.070 (0.047-0.081) long by 0.051 (0.037-0.063) wide; dorsal squamodisk 0.071 (0.061-0.077) long by 0.042 (0.032-0.054) wide. Two lateral, saccate peduncle glands filled with cells, and one bladder-like saccate medial structure located in the peduncle, all three structures apparently opening on or near opishaptor. Mouth ventral to anterior eyespots; buccal canal narrow. Pharynx slightly bilobed in all specimens studied, weakly piriform, 0.038 (0.034-0.043) long by 0.031 (0.023-0.036) wide. Esophagus extremely short. Gut bifurcated, crura unramified and apparently not confluent posteriorly. Testis somewhat irregular in shape, most often ovoid, 0.025 (0.022-0.034) long by 0.023 (0.020-0.027) wide, slightly post-equatorial, in midline; vas deferens apparently passing anteriorly on the left side, appearing to form a seminal vesicle at base of cirrus. Cirrus composed of an unusual forked base, lying within a fusiform chamber, and a hollow, tubular portion with a sligthly flared tip, 0.026 (0.022-0.035) long by 0.002 (0.001-0.002) wide. Unidentifiable, seemingly hollow, J-shaped cuticularized structure running into the cirrus dextrally. Genital pore common, slightly dextral to the midventral line near cirrus tip. Ovary tubular, pretesticular, equatorial, looped over the right intestinal crus; wide oviduct joined by vitelloducts. Uterus extending directly to genital pore. Vaginal pore to left of the midventral line at about one-third level of body, cuticularized external

plate situated around vaginal pore; vaginal duct also cuticularized, widened medially to join seminal receptacle which enters oviduct from left. Mehlis' gland not observed. Vitellaria follicular, near intestinal crura, extending from anterior level of pharynx and terminating shortly posterior to intestinal junction; transverse vitelloducts converging immediately anterior to ovary. No eggs observed. "Brain" dorsal to buccal tube; 4 eyespots angularly situated antero-dorsally to pharynx near "brain."

Discussion: *Diplectanum bilobatus* n. sp. is apparently most closely related to *D. girellae* (Johnston and Tiegs, 1922) Price, 1937 from which it differs in the following respects: (1) bifurcation of the cirrus base, (2) ventral anchors with only one prominent root, (3) shape of bars slightly different, (4) host.

The ovary of this species loops around the right crus of the gut, a character which, although not often previously reported, may be significant. Yamaguti (1953) describes the ovary as looping around the gut in one species of *Pseudolamellodiscus* Yamaguti, 1953 and in three species of *Lamellodiscus* Johnston and Tiegs, 1922. Since this character is present in all the diplectanids in the present collection a restudy of the previously described forms will probably confirm it in many of them. This feature is present in many capsalids and may be an indication of some phylogenetic relationship between the two groups.

Rhamnocercus Monaco, Wood and Mizelle, 1954, *emend.*

Diagnosis: Diplectaninae. Body elongate, flattened dorso-ventrally, opisthaptor bilobed. Posterior portion of cuticle spinous. Head organs present. Peduncle glands and medial bladder-like structure present. Lateral plaques, each consisting of a row of hook-like spines and dorsal and ventral plaques, consisting of two chevron-like rows of hook-like spines, present. Dorsal and ventral groups of strong, anteriorly curved spines situated mid-terminally on the opisthaptor. Additional hook-like spines and shorter, often clumped, spines also on opisthaptor. One ventral and two dorsal bars present. Two dissimilar anchor pairs and 14 marginal hooks. Cirrus elongate, cuticularized, spiralled or straight. Ovary pretesticular, looped around right intestinal crus. Vaginal pore ventral or lateral.

Type species: *Rhamnocercus rhamnocercus* Monaco, Wood and Mizelle, 1954.

Synonym: *Pedunculospina* Hargis, 1954.

Rhamnocercus differs from other diplectanids in the following characters: (1) dorsal and ventral plaques and not squamodisks present, (2) spinous lateral plaques on peduncle, (3) additional spines grouped on haptor. Apparently this genus occupies a somewhat isolated position in the subfamily because it is very different from any previously described. The above rediagnosis is given in order to include additional data on the genus obtained from studies of the paratypes (USNM Helm. Coll. No. 49426) of *Rhamnocercus rhamnocercus*, the type species, and *Rhamnocercus bairdiella*

n. sp. The name *Pedunculospina* Hargis, 1954 is listed as a synonym of *Rhamnocercus* because it appeared in an abstract, Hargis (1954), published several days after publication of the latter name by Monaco, Wood and Mizelle (1954).

Rhamnocercus rhamnocercus Monaco, Wood and Mizelle, 1954

This species occurs, according to the original authors, on the gills of the marine sciaenid, *Umbrina roncador,* in the Pacific Ocean off California. It is interesting and probably phylogenetically significant that *Bairdiella chrysura,* the host of the new rhamnocercid described below, is also a member of the piscine family Sciaenidae.

A study of two paratype specimens on the above listed slides indicates that the original authors were probably mistaken concerning the dorso-ventral orientation of the opisthaptor. Even though the paratypes were twisted several times, careful check reveals that the long, single, longitudinally-furrowed bar is actually dorsal and not ventral. Also, the anchors labelled as ventral in the paper by Monaco, Wood and Mizelle (1954) are really dorsal and vice versa. This clarification means that the bars and anchors are truly diplectanid in location and general shape and not different. Although difficult to ascertain microscopically in the paratypes, it appears that lateral plaques, each composed of a row of anteriorly-directed spines, are present on each side of the peduncle.

As a direct result of miscroscopic studies of *R. rhamnocercus* and the new species detailed below it is herein contended that the differences employed by Monaco, Wood and Mizelle (1954) as a basis for their subfamily Rhamnocercinae are insufficient to support such action. The reasons underlying this contention are: (1) The dorsal and ventral plaques are probably homologous to the squamodisks of other diplectanids. (The supposed perenchymatous origin of these and other spinous parts which was mentioned by the original authors is much too uncertain to be a taxonomically reliable character.) (2) The detailed similarity of the haptoral bars, anchors, hooks, lateral plaques, body shape and the arrangement of internal organs to the same structures in other diplectanids are not counterbalanced by sufficient morphological differences. The existing differences mentioned immediately above in this discussion are herein adjudged of generic but not subfamilial significance; therefore, the subfamily Rhamnocercinae Monaco, Wood

and Mizelle, 1954 is rejected and its type genus *Rhamnocercus* is considered a subordinate, albeit somewhat aberrant, group of the subfamily Diplectaninae.

Rhamnocercus bairdiella n. sp.

(Figures 56-60)

Host: *Bairdiella chrysura* (Lacépède), Silver Perch, a bentho-littoral marine sciaenid.

Location: Gills.

Locality: Alligator Harbor, Franklin Co., Florida.

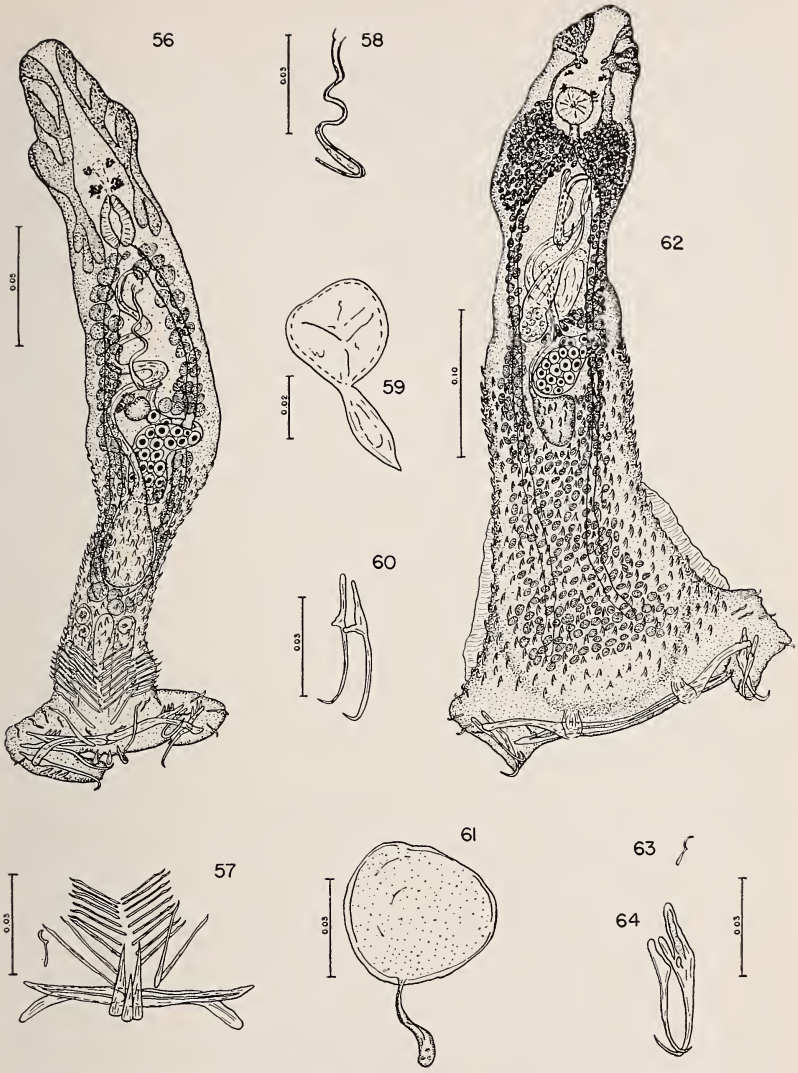
Number studied: 158.

Number measured: 5.

Holotype: USNM Helm. Coll. No. 49345.

Paratype: USNM Helm. Coll. No. 49346.

Description: Very small diplectanid, body weakly fusiform, 0.350 (0.298-0.401) long by 0.056 (0.040-0.069) wide, angular anteriorly, narrowed posteriorly to join opisthaptor. Cuticle thin and smooth anteriorly, projected into numerous anteriorly directed spines encircling body from level of ovary to opisthaptor. Prohaptor of 3 pairs of antero-lateral head organs connected by ducts to posterior cephalic glands that are lateral to the pharynx. Opisthaptor bilobed, 0.110 (0.097-0.131) long, armed with 2 pairs of laterally placed anchors, 3 bars, 4 groups of short spines and 14 marginal hooks. Anchors delicate, subequal, dissimilar in shape; ventral anchors, 0.040 (0.036-0.042) long by 0.003 wide, superficial roots delicate, at right angles to main axis anchor, deep roots longer, shafts long and nearly straight, tips slightly recurved; dorsal anchors 0.040 (0.038-0.041) long by (4) 0.001 wide at base, superficial roots shorter than those of ventral anchor, deep roots long. Ventral bar elongate, weakly fusiform, 0.070 (0.061-0.078) long by 0.005 (0.004-0.005) wide, longitudinally furrowed; dorsal bars club-shaped, curved, 0.041 (0.035-0.046) long by 0.005 (0.004-0.005) wide, nearly meeting in midline, articulating with dorsal anchors laterally. Fourteen hooks present, about 0.009 long, 6 pairs on margins of lateral lobes and 1 pair near the mesial ends of dorsal bars. Median plaques located mostly on the peduncle, but extending slightly onto the opisthaptor posteriorly; ventral plaque, (3) 0.057 (0.030-0.081) long by (3) 0.031 (0.028-0.034) wide, composed of 8 to 9 spines, (3) 0.021 (0.018-0.024) long; dorsal plaque, (3) 0.065 (0.036-0.085) long by (3) 0.030 (0.024-0.032) wide, composed of 9 pairs of hook-like spines, (3) 0.020 (0.019-0.022) long, in two rows. Two lateral plaques consisting of 7 to 8 laterally placed spines, spines about (1) 0.015 long. Two saccate peduncle glands situated laterally and a median, elongate, bladder-like structure located in the peduncle; glands and bladder-like structure opening on or near the opisthaptor. Mouth midventral, at level of anterior eyespots; buccal canal leading to pharynx. Pharynx piriform, (3) 0.017 (0.015-0.020) long by 0.015 (0.014-0.018) wide; esophagus absent. Gut bifurcated, crura unramified, apparently confluent posteriorly. Testis saccate, between intestinal crura in posterior half of body, 0.044 (0.041-0.054) long by 0.028



Rhamnocercus bairdiella n. sp.

56. Whole mount, dorsal view.
57. Ventral plaque, with haptoral bars, hooks and spines.
58. Cirrus.
59. Egg, *in utero*.
60. Anchors, ventral anchor uppermost.

Rhabdosynochus rhabdosynochus

61. Egg, *in utero*.
62. Whole mount, dorsal view.
63. Hook.
64. Anchors, ventral anchor largest.

(0.022-0.038) wide; vas deferens prominent. Cirrus complex consisting of a cirrus and possibly an accessory piece. Cirrus, 0.045 (0.032-0.054) long by 0.001 wide, narrow and sinuous; long, thin, spatulate structure curved around cirrus distally may be an accessory piece. Genital pore common, midventral, slightly preequatorial. Ovary elongate, pretesticular, looped over right intestinal crus; oviduct short, joined by vitelloducts immediately anterior to ovary. Ootype short; uterus short, wide, extending a short distance obliquely and anteriorly toward the midline at level of transverse vitelloducts; vaginal pore slightly lateral, vaginal tube wide, opening into spherical seminal receptacle; which apparently opens into the oviduct immediately anterior to ovary. Mehlis' gland not seen. Vitellaria follicular, near intestinal crura, extending from pharynx posteriorly to the peduncle; transverse vitelloducts converging immediately anterior to ovary. Egg *in utero* apparently spherical, with a stout, fusiform filament at one end. Four eyespots dorsal to buccal canal.

Discussion: *Rhamnocercus bairdiella* n. sp. is definitely rhamnocercid in nature but differs from the type species, *R. rhamnocercus*, in the following characters: (1) body and all hard parts much smaller, (2) shape of anchors, (3) cirrus spiralled and not straight, (4) shape and number of the spines of the dorsal, ventral and lateral plaques, (5) host.

As mentioned above, it is interesting and perhaps significant that both of the known species of the aberrant genus *Rhamnocercus* occur on hosts of two genera which belong to the same family, Sciaenidae.

Genus *Rhabdosynochus* Mizelle and Blatz, 1941 *emend.*

Synonym: *Rhadbosynochus* Mizelle and Blatz, 1941. (Definitely a misprint as Sproston, 1946, suggested.)

Diagnosis: Diplectaninae. Body elongate, flattened dorso-ventrally, widened posteriorly. Posterior body spines present. Prohaptor of three pairs of head organs connected by ducts to posterior cephalic glands. Opisthaptor bearing two pairs of dissimilar anchors and three separate bars, two of which are dorsal, and 14 marginal hooks. Lateral plaques present. Cirrus and accessory piece cuticularized. Ovary looped around intestinal crus. Vaginal pore apparently ventral. Intestinal crura not confluent posteriorly.

Type species *Rhabdosynochus rhabdosynochus* Mizelle and Blatz, 1941.

The above emendation is made necessary by the redescription of the type species which demonstrates clearly the diplectanid affinities of the genus (see below). The genus *Rhabdosynochus* is regarded as valid because it is different from all other genera of Diplectaninae in possessing only the clear, lateral plaques and having neither squamodisks nor dorsal and ventral plaques.

Rhabdosynochus rhabdosynochus Mizelle and Blatz, 1941 (Figures 61-64)

Host: *Centropomus undecimalis* (Bloch), Snook, a euryhaline, littoral centropomid.

Location: Gills.

Locality: Tampa Bay, Florida.

Previously reported host and locality: *Centropomus undecimalis*, Myakka River, East Sarasota, Florida.

Number studied: 177.

Number measured: 1.

Holotype: USNM Helm. Coll. No. 49347.

Redescription: Body elongate, 0.503 long by 0.185 wide anteriorly, anterior end angular, posterior end extremely wide and spatulate. Cuticles fairly thick, smooth anteriorly, with numerous anteriorly directed spines in posterior portion. Prohaptor 3 pairs of head organs connected by ducts to posterior cephalic glands. Opisthaptor wide, spatulate, bilobed, 0.049 long by 0.237 wide, armed with 2 pairs of anchors, 3 bars, and 14 marginal hooks laterally placed. Anchors dissimilar in size and shape, laterally placed on haptor lobes; ventral anchors larger, 0.047 long by 0.004 wide at base, superficial roots short, finger-like, deep roots longer and broader, extra protuberance often seen on mesial surface; dorsal anchors shorter, 0.028 long by 0.003 wide at base, superficial roots apparently vestigial, deep roots short, both anchor pairs have delicate, nearly straight shafts and recurved tips. Dorsal bar, 2 pieces, slightly curved, clavate in outline, 0.063 long by 0.009 wide, not fused to ventral bar or each other as described by Mizelle and Blatz (1941), but anchored to the haptor mesially by stout muscular masses and articulated with dorsal anchors laterally. Ventral bar elongate, slightly curved, 0.163 long by 0.004 wide, with pointed ends and a longitudinal furrow. Hooks marginal, mostly on haptoral lobes, delicate, 0.016 long, 1 pair situated near dorsal bars. Peduncle widened to opisthaptor, bearing spines and ornamented with transparent, lateral plaques which are striated by slight thickenings that may be homologous to the spines. Mouth not seen, probably midventral to level of eyespots. Pharynx circular in outline, 0.027 in diameter; esophagus short. Gut bifurcated, crura unramified, not confluent posteriorly. Testis ovoid to subtriangular in outline 0.034 long by 0.026 wide, equatorial in midline posterior to ovary; vas deferens to left of midline, extending sinuously to cirrus bulb. Cirrus complex consisting of an elongate cirrus bulb, cirrus and accessory piece. Cirrus bulb small, elongate, to right of midline, opening into cirrus anteriorly; cirrus stout, curved, hollow tube, 0.054 long by 0.005 wide surrounded throughout most of its length by the accessory piece; accessory piece irregularly shaped, curved around cirrus and recurved on itself distally. Saccate structure interpreted as a prostate reservoir situated obliquely across body to left side, anterior to ovary, some prostate elements apparently in posterior end of this body. Genital pore common, opening dextroventrally at one-third level of body. Ovary tubular to saccate, pretesticular, looped over right crus of intestine; short oviduct proceeding anteriorly. Ootype short; uterus a wide, thin walled duct opening at genital pore. Vaginal pore nearly midventral at posterior one-third level; vaginal tube joining oviduct near junction of Mehlis' gland. Mehlis' gland unicellular. Vitellaria follicular, mostly near intestinal crura, extensive lateral fields just posterior to pharynx, extending nearly to haptor posteriorly; vitelloducts converging to oviduct immediately anterior to ovary. Egg spherical, 0.068 in

diameter, with a short clavate filament. Four eyespots antero-dorsal to pharynx.

A study of the cotype material, USNM Helm. Coll. slide No. 36822, and specimens in the present collection showed that the original authors, Mizelle and Blatz (1941), were mistaken concerning the dorsal bars which they described as medially fused. There are actually two widely separated dorsal bars. In addition, these authors did not mention the cuticular spines and lateral plaques. Also, a vaginal pore is probably present ventrally.

The definite diplectanid characteristics of *R. rhabdosynochus* revealed by the present study necessitate its transfer from Tetraonchinae to Diplectaninae. These characters are: (1) three haptoral bars, two dorsal, (2) furrowed ventral bar, (3) anchor shape, (4) posterior body spines, (5) ovary looped around intestinal crus, (6) lateral plaques.

Summary and Conclusions

In this, the third installment of the present series of papers dealing with monogenetic trematodes from the Gulf of Mexico, it is suggested that the genus *Tetrancistrum* Goto and Kikuchi, 1917 badly needs redefinition. The diagnosis of the subfamily Diplectaninae Monticelli, 1903 is emended in order to include the genera *Rhabdosynochus* Mizelle and Blatz, 1941 *emend.* and *Rhamnocercus* Monaco, Wood and Mizelle, 1954 *emend.* The transfer of *Rhamnocercus* to the subfamily Diplectaninae because of its diplectanid characteristics necessitates rejection of the subfamily Rhamnocercinae Monaco, Wood and Mizelle, 1954 of which it is the type genus. It is concluded that the status of *Neodiplectanum* Mizelle and Blatz, 1941 requires further clarification.

In all, three new and two previously described species are described and/or discussed. These are *Pseudohaliotrema mugilinus* n. sp., *Diplectanum bilobatus* n. sp., *Rhamnocercus bairdiella* n. sp., *Tetrancistrum longiphallus* (MacCallum, 1915) Price, 1937 and *Rhabdosynochus rhabdosynochus* Mizelle and Blatz, 1941. Because the preceding monogeneids were actually recovered from Gulf hosts this constitutes a new locality report for all. In addition, *Haplocleidus vanbenedenia* (Parona and Perugia, 1890) Palombi, 1949 is briefly treated. It is suggested that *Tetrancistrum lutiani* Tubangui, 1931 probably belongs in another genus. As a result of restudy of the type material certain points of the morphology

of *Rhamnocercus rhamnocercus* Monaco, Wood and Mizelle, 1954 are clarified.

This paper completes presentation of data on members of the superfamily Gyrodactyloidea Johnston and Tiegs, 1922. Part IV will treat the superfamily Capsaloidea Price, 1936.

Literature Cited

GOTO, S., and H. KIKUCHI
1917. Two new trematodes of the family Gyrodactylidae. Jour. Coll. Sci. Tokyo 39: 1-22.

HARGIS, W. J., JR.
1954. Monogenetic trematodes of some Gulf of Mexico fishes. Dissertation Abstracts, Zoology Sect., Publ. No. 8258, Vol. XIV (1954): 1115-1116.

MacCALLUM, G. A.
1915. Some new species of ectoparasitic trematodes. Zoologica 1: 303-410.

MIZELLE, J. D., and V. BLATZ
1941. Studies on monogenetic trematodes. VI. Two new dactylogyrid genera from Florida fishes. Amer. Midl. Nat. 26: 105-109.

MONACO, L. H., R. A. WOOD and J. D. MIZELLE
1954. Studies on monogenetic trematodes. XVI. Rhamnocercinae, a new subfamily of Dactylogyridae. *Ibid.* 52: 129-132.

PEARSE, A. S.
1949. Observations on flatworms and nemerteans collected at Beaufort, N. C. Proc. U. S. Nat. Mus. 100: 25-38.

PRICE, E. W.
1937. North American monogenetic trematodes. I. The superfamily Gyrodactyloidea. (Cont.). Jour. Wash. Acad. Sci. 27: 146-164.

SPROSTON, N. G.
1946. A synopsis of the monogenetic trematodes. Trans. Zool. Soc. London. 25: 185-600.

YAMAGUTI, S.
1953. Parasitic worms mainly from Celebes. Part 2. Monogenetic trematodes of fishes. Acta Med. Okayama 8: 203-256.